This report contains the following 1 ideas:

Idea No.	Title	Inventors	Entered	Updated
78927	Forwarding Packets in a Gateway Performing Network Address Translation (NAT)	Amit Phadnis (asp),Anuradha Karuppiah (ak),Praneet Bachheti (praneetb)		

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Forwarding Packets in a Gateway Performing Network Address Translation (NAT)

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Idea Details

Appl. No.: 09/910,936
Exhibit A (Page 1of 2)

Inventors:

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Background: SSG (Service Selection Gateway) provides users access to overlapping services. For eg. Host1 can connect to Service1 and Host2 to Service2 where Service1 and Service2 have overlapping IP address space. For forwarding upstream traffic from the host to the service, the host's IP address (or the packet's source IP address) is also used as a distinguisher, as the destination addresses can overlap and are not sufficient to arrive on a unique route. In other words we use a source-destination IP address combination for route lookup.

Similarly, in the downstream path, we need the NAT lookup first and then the route lookup, both the translation and route determination could be done in a single lookup on a unified Route/NAT table. SSG also permits users simultaneous access to multiple private services, each of which assign a different real IP address to the same host(which already has a virtual IP address associated with it). Consequently NAT lookup is essentially required on a per-packet basis to translate the virtual IP to real IP. The performance degradation introduced by NAT is more because of the lookup than the actual translation.

Prior Art: ---

Summary: Since we have to use the source and destination IP address pair for route lookup in SSG forwarding path, as well as during NAT lookup, we can unify the route and the NAT information into a single table, so that only one lookup is sufficient. Here the idea is to unify the route and the NAT table, which would result into performance gains. Although the NAT and the route table functionality is well documented by IETF, the unification of NAT/Routing tables has not been explored till date. This would allow future hardware/asic implementation of a unified table which would not onlyimprove throughput, but would also make "Service Selection" possible in in switches.

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The route lookup in the upstream direction for SSG anyway uses the both the source and destination IP addresses, which are sufficient for arriving on the NAT entry too. As NAT conveniently happens after route lookup in the upstream direction, why a separate NAT lookup at all?
We can avoid this redundant NAT lookup by storing the NAT entry in SSG's upstream forwarding database (this is just a reference to the NAT entry maintained in the NAT table, and the route engine does not need to separately process or manage the NAT entry).

NAT lookup and translation in IOS are tightly coupled. By separating the lookup from translation we can avoid the NAT lookup altogether, and rely on the SSG routing engine itself to provide the NAT entry for translation.

Restatement: - - -

Advantages: - The no NAT scenario has been observed to have 22-53% higher performance
(reference - CSCdm70488). Our solution attempts to achieve a no-NAT like performance by avoiding the NAT lookup (and still geting the translation done!).

- By divorcing the NAT lookup and NAT translation we allow applications/ features to provide the NAT entry if it is equipped to do so, thereby relieving NAT of distinct extensive lookup procedure.

- A unified Route/NAT table (possibly with ACLs) can be implemented in ASICs, which can make "Service Selection" Possible at the hardware level - possible implementations in L3/L4 Switches.